

1. DESCRIPTION OF THE PROCEDURE OR MEDICATION REQUESTED

Monitoring infusion of the following medications during interfacility transports:

- a. Intravenous nitroglycerin (NTG)
- b. Heparin
- c. Potassium Chloride (concentration not to exceed 40 mEq/liter)

2. DESCRIPTION OF THE MEDICAL CONDITIONS FOR WHICH THEY WILL BE UTILIZED

Patients requiring interfacility transport who have:

- a. IV NTG – Unstable angina and congestive heart failure
- b. IV Heparin – Continuation of treatment for angina or following thrombolytic therapy
- c. Potassium Chloride – Treatment of hypokalemia

3. ALTERNATIVES

Use of Registered Nurses during transfer is limited in our county, based on staffing patterns in hospitals and RN supply shortage. Critical Care Transport availability is also limited and unable to provide timely transport of patients needing emergent evaluation at a second facility.

4. PATIENT POPULATION THAT WOULD BENEFIT, INCLUDING ESTIMATE OF FREQUENCY OF UTILIZATION:

- a. Intravenous NTG and Heparin: 50-75 times per year
- b. Intravenous Potassium Chloride: 10-20 times per year

5. OTHER FACTORS OR EXCEPTIONAL CIRCUMSTANCES:

Use of all three agents will be limited only to interfacility transfer, and will be utilized only by paramedics with special training in critical care transfers.

6. ANY SUPPORTING DATA, INCLUDING RELEVANT STUDIES AND MEDICAL LITERATURE:

Use of these medications falls under well established standards for treatment of acute coronary syndromes and hypokalemia. This proposal is similar in content to those of several other EMS agencies previously approved for these optional scope items.

7. RECOMMENDED POLICIES/PROCEDURES TO BE INSTITUTED REGARDING USE, MEDICAL CONTROL, TREATMENT PROTOCOLS, AND QUALITY ASSURANCE OF THE PROCEDURE OR MEDICATION:

See attached

8. DESCRIPTION OF THE TRAINING AND COMPETENCY TESTING REQUIRED TO IMPLEMENT THE PROCEDURE OR MEDICATION:

See attached

(ADDENDUM TO #7)
PREHOSPITAL TREATMENT GUIDELINES

INTRAVENOUS INFUSION OF NITROGLYCERIN

PURPOSE: To authorize CCT-Ps to monitor and adjust existing intravenous nitroglycerin infusions during scheduled interfacility transport.

POLICY:

1. This procedure shall only be performed by paramedics with CCT-P (Critical Care Transport-Paramedic) training and designation.
2. CCT-Ps may not initiate nitroglycerin infusions.

PROCEDURE:

1. Patients shall be placed and maintained on cardiac and pulse oximetry monitors during transport.
2. A non-invasive blood pressure monitor device that will record and print out blood pressure readings every five (5) minutes will be utilized.
3. Signed transfer orders from the transferring physician must be obtained prior to transport. Transfer orders must provide for maintaining the nitroglycerin infusion during transport.
4. If medication administration is interrupted (infiltration, accidental disconnection, malfunctioning pump, etc.) the CCT-P may restart the line as delineated in the transfer orders.
5. Infusions must be regulated by a mechanical pump familiar to the CCT-P. If pump failure occurs and cannot be corrected, the paramedic is to discontinue the nitroglycerin infusion and notify the transferring physician, or the base physician if the transferring physician is not available.
6. The following parameters shall apply to all patients with pre-existing nitroglycerin infusions:
 - ?? Infusion will be either NS or D5W. Medication concentration will be either half-strength (25 mg/250ml or 50 mg/500 ml) or full-strength (50mg/250 ml).
 - ?? Regulation of the infusion rate will occur within the parameters as defined by the transferring physician, but in no case will changes be in greater than 5 mcg/minute increments every 5 minutes.
 - ?? CCT-Ps may institute two infusion rate changes prior to consulting with the Base Hospital. Any additional changes must be made only after contact with the Base Hospital.
 - ?? Infusion rates may not exceed 50 mcg/minute.
 - ?? In cases of severe hypotension (systolic pressure less than 90 mm Hg), the medication infusion will be discontinued and transferring physician Base Hospital notified.

(ADDENDUM TO #7)**IV NITROGLYCERIN INFUSION RATES**

ml/hr	mcg/min	
	Half-strength concentration (100 mcg/ml)	Full-strength concentration (200 mcg/ml)
	25 mg/250 ml or 50 mg/500 ml	50 mg/250 ml
1	1.7	3.3
2	3.3	6.7
3	5.0	10.0
4	6.7	13.3
5	8.3	16.7
6	10.0	20.0
7	11.7	23.3
8	13.3	26.7
9	15.0	30.0
10	16.7	33.3
11	18.3	36.7
12	20.0	40.0
13	21.7	43.3
14	23.3	46.7
15	25.0	50.0
16	26.7	
17	28.3	
18	30.0	
19	31.7	
20	33.3	
22	36.7	
24	40.0	
26	43.3	
28	46.7	
30	50.0	

(ADDENDUM TO #7)
PREHOSPITAL TREATMENT GUIDELINES

INTRAVENOUS INFUSION OF HEPARIN

PURPOSE: To authorize CCT-Ps to monitor existing intravenous heparin infusions during scheduled interfacility transport.

POLICY:

1. This procedure shall only be performed by paramedics with CCT-P (Critical Care Transport-Paramedic) training and designation.
2. CCT-Ps may not initiate heparin infusions.

PROCEDURE:

1. Patients shall be placed and maintained on cardiac and pulse oximetry monitors during transport.
2. Signed transfer orders from the transferring physician must be obtained prior to transport. Transfer orders must provide for maintaining the heparin infusion during transport.
3. If medication administration is interrupted (infiltration, accidental disconnection, malfunctioning pump, etc.) the CCT-P may restart the line as delineated in the transfer orders.
4. Infusions must be regulated by a mechanical pump familiar to the CCT-P. If pump failure occurs and cannot be corrected, the paramedic is to discontinue the heparin infusion and notify the transferring physician, or the base physician if the transferring physician is not available.
5. The following parameters shall apply to all patients with pre-existing heparin infusions:
 - ?? Medication concentration will not exceed 100 units/ml of IV fluid (25,000 units/250 ml or 50,000 units/500 ml)
 - ?? Infusion rates must remain constant during transport with no regulation of rates being performed by the CCT-P, except for the discontinuation of the infusion (e.g., as in a case of bleeding).
 - ?? Infusion rates may not exceed 1600 units per hour.
 - ?? Vital signs are to be monitored as indicated in the transfer orders.

(ADDENDUM TO #7)
PREHOSPITAL TREATMENT GUIDELINES

INTRAVENOUS INFUSION OF POTASSIUM CHLORIDE

PURPOSE: To authorize CCT-Ps to monitor existing intravenous potassium chloride (KCl) infusions during scheduled interfacility transport.

POLICY:

1. This procedure shall only be performed by paramedics with CCT-P (Critical Care Transport-Paramedic) training and designation.
2. CCT-Ps may not initiate KCl infusions.

PROCEDURE:

1. Patients shall be placed and maintained on a cardiac monitor during transport.
2. Signed transfer orders from the transferring physician must be obtained prior to transport. Transfer orders must provide for maintaining the KCl infusion during transport.
3. If medication administration is interrupted (infiltration, accidental disconnection, malfunctioning pump, etc.) the CCT-P may restart the line as delineated in the transfer orders.
4. Infusions must be regulated by a mechanical pump familiar to the CCT-P. If pump failure occurs and cannot be corrected, the paramedic is to discontinue the KCl infusion and notify the transferring physician, or the base physician if the transferring physician is not available.
5. The following parameters shall apply to all patients with pre-existing KCl infusions:
 - ?? Medication concentration will not exceed 40 mEq per liter of IV fluid.
 - ?? Infusion rates must remain constant during transport with no regulation of rate being performed by the paramedic.
 - ?? Infusion rates may not exceed 10 mEq per hour.
 - ?? Vital signs are to be monitored as indicated in the transfer orders.

(ADDENDUM TO #7)
QUALITY ASSURANCE PROCEDURE

1. All CCT-P interfacility transfers will undergo review by provider agency, and standard data elements shall be reported. The provider agencies all must have QI plans approved by the EMS Agency, and the provider QI programs are required to have R.N. and physician oversight.
2. Specific review for use of intravenous NTG, heparin and KCl will include:
 - a. Review of transferring physician's orders and evidence of compliance with orders
 - b. Documentation of vital signs
 - c. Documentation of any side effects/complications (including hypotension, bradycardia, increasing chest pain, arrhythmia, altered mental status) and interventions with these events
 - d. Documentation of any discontinuation of infusions
 - e. Review of any base contact or contact of transferring physician for orders during transport
3. Results of reviews shall be communicated in monthly report format from the provider agency to the EMS Medical Director.
4. Significant complications shall be communicated to the EMS agency within 48 hours.

(ADDENDUM FOR #8)

TRAINING – ADVANCED SCOPE

CCT-P training will include a comprehensive 80-hour didactic and 40-hour clinical course.

Topics to be covered pertinent to the additional scope requested include:

Monitoring of critical patients

Management and troubleshooting of intravenous pumps

Use of intravenous nitroglycerin, heparin, and KCl

Total time related to the above topics, including lecture, skills demonstration and practice, written and skills exams, shall be no less than 4 hours.

Course objectives specific to additional scope items:

At the end of the training, participants will be able to:

- ?? Identify actions, indications, contraindications, adverse effects, administration guidelines, and precautions for intravenous nitroglycerin, heparin, and potassium chloride infusions
- ?? Demonstrate basic competency in use of IV pumps, including infusion rate adjustment and troubleshooting
- ?? Describe appropriate management of patients with IV nitroglycerin, heparin, or potassium chloride infusions during interfacility transport
- ?? Demonstrate utilization of physician order forms and provide required documentation for the various agents used
- ?? Understand the goals of quality assurance/improvement and the criteria to be monitored on all interfacility CCT-P transports.

Written exam of 25 questions, with passing score of 80% (see below)

Skills exam (see below)

ADVANCED SCOPE TESTING

Choose the **BEST** answer and mark on the answer sheet provided

1. Paramedics must be specifically trained and designated as CCT-P providers in order to administer IV heparin, nitroglycerin, and potassium (concentrations between 20-40 meq/L)
 - a. True
 - b. False
2. IV heparin, nitroglycerin, and potassium (concentrations between 20-40 meq/L) infusions may be initiated by the CCT-P during transport
 - a. True
 - b. False
3. Low serum potassium is called:
 - a. Hyponatremia
 - b. Hypokalemia
 - c. Hyperkalemia
 - d. Hypocalcemia
4. Under CCT-P guidelines, potassium can be added to an IV solution up to a concentration of:
 - a. 10 meq/L
 - b. 10 mg/L
 - c. 40 meq/L
 - d. 40 mg/L
5. Hypokalemia can result in:
 - a. Weakness
 - b. Cardiac arrhythmias
 - c. Paralysis
 - d. All of the above
6. Intravenous potassium may cause all of the items listed below **EXCEPT**:
 - a. Local irritation at the IV site
 - b. Hypertension
 - c. Cardiac arrest
 - d. Electrocardiogram changes
7. The maximum rate of KCl allowed per hour is
 - a. 5 meq/hour
 - b. 5 mg/hour
 - c. 10 meq/hour
 - d. 10 mg/hour
8. Nitroglycerin:
 - a. Increases blood pressure
 - b. Depresses central nervous system activity
 - c. Vasodilates, leading to preload and afterload reduction
 - d. Decreases platelet aggregation

9. IV Nitroglycerin may be utilized for:
 - a. Unstable angina
 - b. Chest pain following myocardial infarction
 - c. Congestive heart failure
 - d. All of the above
10. IV Nitroglycerin:
 - a. Has a slow onset of action, so careful titration is not needed
 - b. May cause hypotension
 - c. Rates should be increased if the patient's blood pressure is above 150 systolic
 - d. Won't cause headache like sublingual nitroglycerin
11. Contraindications to IV nitroglycerin include all **EXCEPT**:
 - a. Head trauma with increased intracranial pressure.
 - b. Hypotension
 - c. Hypertension
 - d. Sensitivity to nitrates
12. The rate of IV administration of nitroglycerin:
 - a. Should remain fixed during transport
 - b. Should be decreased if the patient develops hypotension
 - c. Should be increased if the patient develops hypotension
 - d. Should be stopped if the patient gets a headache
13. IV Nitroglycerin:
 - a. Does not need regulation with a pump
 - b. Cannot be mixed with other medications
 - c. Can be given at a rate up to 500 mcg/minute
 - d. Does not require cardiac monitoring as a standard procedure
14. Rates of IV nitroglycerin:
 - a. May not exceed 50 mcg/minute
 - b. May be increased if the patient develops increasing chest pain
 - c. Should be increased no more than 5 mcg increments every 5 minutes
 - d. All of the above
15. IV Heparin actions include:
 - a. Improved clotting
 - b. Sedation
 - c. Anticoagulation
 - d. Pain relief
16. Indications for IV heparin include:
 - a. Pulmonary emboli
 - b. Chest pain due to coronary occlusion or myocardial infarction
 - c. Deep vein thrombosis
 - d. All of the above

17. IV heparin contraindications include all **EXCEPT**:
- Sensitivity to heparin
 - Bleeding disorders
 - Leaking aortic aneurysm
 - Recent treatment with aspirin or thrombolytic therapy for MI
18. Adverse effects of heparin infusion include:
- Hypertension
 - Bradycardia
 - Nosebleed, hematuria, melena, or other signs of hemorrhage
 - Hiccups
19. IV heparin infusion rates:
- Can be turned up if the patient has increasing chest pain
 - Should not be turned off even if the IV infiltrates
 - Should remain constant during transport
 - Are the same for all patients
20. IV heparin:
- Cannot be used in pregnant patients
 - Make IM injections subject to causing bleeding and pain
 - Allergy to this is exceedingly rare
 - Never causes intracranial hemorrhage
21. During transport of a patient with an IV heparin infusion, the IV pump alarm sounds. After checking the pump and IV lines, and resetting the pump, the alarm continues. There is no sign of infiltration and the patient is asymptomatic. The best action to take is to:
- Disable the alarm but continue the infusion at the specified rate
 - Speed up the infusion by 10% to see if this will correct the problem
 - Continue the infusion but contact the base for direction
 - Decrease the rate of infusion by 50 percent
22. A 68 year old patient with recent myocardial infarction is being transported with an IV nitroglycerin infusion. The patient is receiving NTG at 25 mcg/minute and has no pain or chest pressure. Five minutes ago, the patient had a blood pressure of 140/80, pulse of 80, and respirations 16. Cardiac monitor shows normal sinus rhythm with no ectopy. The patient suddenly complains of lightheadedness and becomes diaphoretic. Your first action should be:
- Decrease nitroglycerin infusion to 20 mcg/minute
 - Contact base for instructions
 - Stop the nitroglycerin infusion
 - Reassess the patient's vital signs, cardiac rhythm, pain level, and level of consciousness

23. The patient described in the question above now has a blood pressure of 86/P, pulse is 94, respirations 20. Skin is pale warm and moist. The patient is alert and fully oriented. He denies chest pain or pressure but has some mild nausea. All of the following actions are correct **EXCEPT**:
- a. Decrease nitroglycerin infusion to 20 mcg/minute
 - b. Begin a dopamine infusion at 2 mcg/kg/minute
 - c. Check infusion and pump for appropriate functioning, appropriate rate, and possible infiltration
 - d. Reassess vital signs, cardiac rhythm, and pain level in 3-5 minutes.
24. A patient with hypokalemia is being transferred for special studies at a second hospital. The patient initially was very weak, has already received potassium supplementation via IV for the past four hours at the initial hospital, and is receiving 10 meq/KCl per hour via infusion pump. Enroute to the second hospital, the patient's cardiac monitor begins to change, showing QRS widening (0.12 milliseconds) that was not present initially. Blood pressure is Your best action:
- a. Contact base
 - b. Give calcium and sodium bicarbonate immediately, but keep potassium infusion running
 - c. Re-evaluate in 5-10 minutes to see if there is further QRS widening
 - d. Immediately stop the infusion and contact base
25. A patient with unstable angina is being transferred for urgent cardiac catheterization. The patient initially is pain free during transport, with blood pressure 160/70, pulse of 92, and respiratory rate 16. Intravenous nitroglycerin is infusing at 30 mcg/minute. Five minutes before arrival at the second hospital, the patient develops chest pressure and slight dyspnea. Repeat vital signs show blood pressure 130/60, pulse 96, respiratory rate 22. Your best action:
- a. Continue as before as you are only five minutes away from the hospital.
 - b. Decrease nitroglycerin infusion because blood pressure has come down to 130/60.
 - c. Increase nitroglycerin infusion to 35 mcg/minute.
 - d. Increase nitroglycerin infusion to 50 mcg/minute.

Answer Key - written test

1. a
2. b
3. b
4. c
5. d
6. b
7. c
8. c
9. d
10. b
11. c
12. b
13. b
14. d
15. c
16. d
17. d
18. c
19. c
20. b
21. c
22. d
23. b
24. d
25. c

ADVANCE SCOPE SKILL EXAM

Scenario #1

You are transporting a 72-year old male with a history of recent myocardial infarction. The patient is alert and fully oriented, resting comfortably, and denying chest pain. He is receiving IV nitroglycerin at 25 mcg/minute. Vital signs taken three minutes ago are: BP 136/80, pulse 80, respirations 16, pulse oximeter SaO₂ 97%. The cardiac monitor shows normal sinus rhythm without ectopy.

The patient suddenly complains of feeling lightheaded and becomes noticeably diaphoretic.

What is your first action?

Expected response:

?? Reassess patient, including vital signs, cardiac rhythm, level of consciousness and pain level

Upon reassessment, blood pressure is 80/P, pulse 94, respirations 20, SaO₂ 95%. Skin is pale, warm, and moist. He is still alert and fully oriented, with no chest pain. Cardiac monitor is unchanged except for rate.

What further actions do you take?

Expected response:

?? Decrease nitroglycerin infusion to 20 mcg/minute

?? Check infusion and pump for proper functioning and appropriate rate.

?? Administer oxygen, high flow

?? Reassess patient in 3-5 minutes, including level of consciousness, vital signs, cardiac rhythm, and pain level.

Five minutes after performing the above actions, the patient states he feels better. His skin color is improved and his skin is drying. Blood pressure is 110/60, pulse 88, respirations 18, SaO₂ is 97%. Cardiac monitor shows now change except decreased rate.

Scenario #2

You are transporting a 78-year-old female with history of recent myocardial infarction. The patient is alert, fully oriented, and pain free. She is receiving intravenous nitroglycerin at 15 mcg/minute. She is also receiving oxygen at 3 l/min via nasal cannula. Vital signs taken five minutes ago are: BP 142/84, pulse 84, respirations 18, SaO₂ 98%. The cardiac monitor shows normal sinus rhythm with occasional unifocal PVC/s.

The patient begins to complain of chest pain rated “5” on a 1-10 scale.

What are your first actions?

Expected response:

- ?? *Check infusion and pump for possible infiltration, appropriate rate, and proper functioning.*
- ?? *Reassess patient, including blood pressure*
- ?? *Unless contraindicated, increase nitroglycerin infusion to 20 mcg/minute*
- ?? *Increase oxygen to high flow*
- ?? *Reassess patient after 3-5 minutes including vital signs, pain level, level of consciousness*

After performing the above actions the patient continues to have chest pain after five minutes. Blood pressure is 150/88, pulse is 88. No changes are noted in level of consciousness, respiratory rate, pulse oximetry, or cardiac rhythm.

What further actions do you take?

Expected response:

- ?? *Increase nitroglycerin infusion 5 mcg every five minutes and continue to reassess patient.*
- ?? *Follow transfer orders for concomitant use of analgesics as indicated.*
- ?? *Contact base hospital if necessary.*

After a third rate increase (infusion 30 mcg/minute), the patient’s chest pain is relieved and vital signs continue within normal limits.

Scenario #3

You are doing a transfer of a 58 year old female with possible myocardial infarction. She is pain free, and has a heparin infusion at 800 units/hour. During transport the patient has a large amount of blood oozing from around the IV sites. The patient is now lethargic and difficult to arouse.

What are your first actions?

Expected response:

- ?? Assess the patient, including level of consciousness, vital signs, cardiac rhythm, pain level, and other signs of hemorrhage*
- ?? Check IV site, tubing, and infusion pump for infiltration, patency, and proper rate/functioning*
- ?? Contact base hospital*

Upon reassessment of the patient, she is alert and oriented only to person. There is blood oozing from previous venipuncture sites on her arms. The IV is patent and the pump is functioning properly. You are unable to make radio contact.

What further actions do you take?

Expected response:

- ?? Discontinue heparin infusion immediately*
- ?? Continue to closely monitor the patient*
- ?? Inform the receiving medical staff immediately upon arrival.*

Scenario #4

You are transporting a 48-year old male with recent episodes of protracted vomiting. He is being treated for hypokalemia with an infusion of potassium chloride. In his IV, 40 meq/L of KCl has been added, and the IV is running at 250 ml/hour. After 10 minutes, he begins to complain of pain at the IV site.

What are your first actions?

Expected response:

?? Check IV site, tubing, and infusion pump for infiltration, patency, and proper rate/functioning

The IV site appears infiltrated. The infusion pump is now giving an alarm signal.

What further actions should you take?

Expected response:

?? Discontinue the infusion immediately.

?? Restart the IV at another peripheral site if possible.

?? Clear the infusion pump alarm and resume the heparin infusion at the previous rate.

?? Continue to monitor the IV site, tubing, and infusion pump for infiltration, patency, and proper rate/functioning.